Date: 19 January 2000
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 105-DR FSB Concrete
Subject: PCB - Data Package No. H0475-RLN (SDG No. H0475)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H0475-RLN prepared by Recra LabNet (RLN). A list of the samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analysis
B0W0Y1	7/20/99	Solid	C	EPA8082*
B0W0Y2	7/20/99	Solid	C	EPA 8082*
B0W0Y3	7/20/99	Solid	C	EPA 8082*

*Equivalent to the requested method (EPA 8080)

Data validation was conducted in accordance with the "Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils" (DOE/RL-99-35). Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

  Sample data were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Solid samples must be extracted within 14 days of the date of sample collection and analyzed within 40 days from the date of extraction.

If holding times are exceeded by less than two times the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than two times the limit, all associated detected sample results are qualified as estimates and flagged "J" and all nondetects are rejected and flagged "UR".

Holding times were met for all samples.

- **Blanks**

Method blank analyses are performed to determine the extent of laboratory contamination introduced through sampling, sample preparation or analysis. At least one method blank analysis must be conducted for every 20 samples. Method blanks should not contain target compounds at a concentration greater than CRQL. If target compounds are present, sample results less than five times the blank concentration are qualified as undetected and flagged "U". If the sample result is less than five times the blank concentration and less than CRQL, the result is qualified as undetected and elevated to the CRQL.

All method blank target compound results were acceptable.

- **Accuracy**

Matrix Spike

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike analyses are performed in duplicate and must be within 70% to 130%. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Nondetected sample results with spike recoveries outside control limits are qualified as estimates and flagged "UJ". Sample results greater than five times the spike concentration require no qualification.

All accuracy results were acceptable.

Surrogate Recovery

The analysis of surrogate compounds provides a measure of performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the laboratory. When a surrogate compound recovery is outside the control window, all positively identified target compounds associated with the unacceptable surrogate recoveries are qualified

as estimates and flagged "J". Nondetected compounds with surrogate recoveries less than the lower control limit are qualified as having an estimated detection limit and flagged "UJ". Nondetected compounds with surrogate recoveries above the upper control limit require no qualification.

Due to surrogate recoveries outside QC limits, all detected PCB results in samples B0W0Y2 and B0W0Y3 were qualfied as estimates and flagged "J" and all undetected PCB results in samples B0W0Y2 and B0W0Y3 were rejected and flagged "UR".

All other surrogate recovery results were acceptable.

- **Precision**

Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike/matrix spike duplicate results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed as the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. For soil samples, results must be within RPD limits of plus/minus 30%. If RPD values are out of specification and the sample concentration is less than five times the spike concentration, all associated detected sample results are qualified as estimates and flagged "J". If RPD values are out of specification and the sample concentration is greater than five times the spike concentration, no qualification is required.

All matrix spike results were accetable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the 105DR PQLs to ensure that laboratory detection levels meet the required criteria. The reported detection limit for all analytes except aroclor-1254 were exceeded in samples B0W0Y2 and B0W0Y3. Under the BHI statement of work, no qualification is required. All other analytes meth the analyte specific PQL.

- **Completeness**

Data Package No. H0475-RLN (SDG No. H0475) was submitted for validation and verified for completeness. The completion percentage was 43%.

MAJOR DEFICIENCIES

Due to surrogate recoveries outside QC limits, all undetected PCB results in samples B0W0Y2 and B0W0Y3 were rejected and flagged "UR". Rejected data is invalid and should not be reported.

MINOR DEFICIENCIES

Due to surrogate recoveries outside QC limits, all detected PCB results in samples B0W0Y2 and B0W0Y3 were qualfied as estimates and flagged "J". Data flagged 'J' is an estimate, but under the BHI validation SOW, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

The reported detection limit for all analytes except aroclor-1254 were exceeded in samples B0W0Y2 and B0W0Y3. Under the BHI statement of work, no qualification is required.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-99-35, *Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils*.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the procedures herein are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are usable for decision-making purposes.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H0475	REVIEWER: TLI	DATE: 1/19/00	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
All except arochlor-1254	UR	B0W0Y2, B0W0Y3	Surrogate diluted out
Arochlor-1254	J	B0W0Y2, B0W0Y3	Surrogate diluted out

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

PCB ANALYSIS, SOLID MATRIX, (UG/KG)

Project: BECHTEL-HANFORD																							
Laboratory: Recra LabNet																							
Case	SDG: H0475																						
Sample Number		B0W0Y1		B0W0Y2		B0W0Y3																	
Location		A		C-1		C-1																	
Remarks																							
Sample Date		07/20/99		07/20/99		07/20/99																	
PCB	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Arochlor-1016	100	84	U	410	UR	410	UR																
Arochlor-1221	100	170	U	820	UR	820	UR																
Arochlor-1232	100	84	U	410	UR	410	UR																
Arochlor-1242	100	84	U	410	UR	410	UR																
Arochlor-1248	100	84	U	410	UR	410	UR																
Arochlor-1254	100	250		1100	J	740	J																
Arochlor-1260	100	84	U	410	UR	410	UR																

	Cust ID:	B0W0Y1	B0W0Y1	B0W0Y1	B0W0Y2	B0W0Y3	PBLKPG
Sample Information	RFW#:	001	001 MS	001 MSD	002	003	99LE0873-MB1
	Matrix:	SOLID	SOLID	SOLID	SOLID	SOLID	SOIL
	D.F.:	2.00	2.00	2.00	10.0	10.0	1.00
	Units:	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
Surrogate:	Tetrachloro-m-xylene	68 %	72 %	82 %	D %	D %	78 %
	Decachlorobiphenyl	47 %	48 %	55 %	D %	D %	72 %
Aroclor-1016		84 U	250 U	250 U	410 U R	410 U R	33 U
Aroclor-1221		170 U	510 U	510 U	820 U R	820 U R	67 U
Aroclor-1232		84 U	250 U	250 U	410 U R	410 U R	33 U
Aroclor-1242		84 U	250 U	250 U	410 U R	410 U R	33 U
Aroclor-1248		84 U	250 U	250 U	410 U R	410 U R	33 U
Aroclor-1254		250	90 %	87 %	1100 J	740 J	33 U
Aroclor-1260		84 U	250 U	250 U	410 U R	410 U R	33 U

	Cust ID:	PBLKPG BS
Sample Information	RFW#:	99LE0873-MB1
	Matrix:	SOIL
	D.F.:	1.00
	Units:	UG/KG
Surrogate:	Tetrachloro-m-xylene	85 %
	Decachlorobiphenyl	78 %
Aroclor-1016		33 U
Aroclor-1221		67 U
Aroclor-1232		33 U
Aroclor-1242		33 U
Aroclor-1248		33 U
Aroclor-1254		88 %
Aroclor-1260		33 U

rec 10/20/99

08-10-99

U= Analyzed, not detected. J= Present below detection limit. B= Present in blank. NR= Not reported. NS= Not spiked.
%= Percent recovery. D= Diluted out. I= Interference. NA= Not Applicable. *= Outside of EPA CLP QC

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Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

RECRA LabNet
a division of Recra Environmental, Inc.
Virtual Laboratories Everywhere

Recra LabNet Philadelphia
Analytical Report

Client: TNU-HANFORD B99-016
RFW#: 9907L501
SDG/SAF#: H0475/B99-016

W.O.#: 10985-001-001-9999-00
Date Received: 07-23-99

PCB

The set of samples consisted of three (3) solid samples collected on 07-20-99.

The samples and their associated QC samples were extracted on 07-27-99 and analyzed according to Recra OPs based on SW846, 3rd Edition procedures on 07-29,30-99. The extraction procedure was based on method 3540 and the extracts were analyzed based on method 8082 for Aroclors only.

The following is a summary of the QC results accompanying the sample results and a description of any problems encountered during their analyses:

1. The cooler temperature has been recorded on the chain-of-custody.

2. All required holding times for extraction and analysis have been met.

3. The samples and their associated QC samples received a sulfuric acid and sulfur cleanup.

4. The method blank was below the reporting limits for all target compounds.

5. All obtainable surrogate recoveries were within acceptance criteria.

6. The blank spike recovery was within acceptance criteria.

7. All matrix spike recoveries were within acceptance criteria.

8. All samples required instrument dilutions due to high concentrations of target analytes. Reporting limits have been adjusted to reflect the necessary dilutions.

9. All initial calibrations associated with this data set were within acceptance criteria.

10. All continuing calibration standards analyzed prior to sample extracts were within acceptance criteria. The CCV run after the samples was increased for Aroclor 1260 on the RTX-5 column only. All results were reported from the RTX-35 column. A copy of the Sample Discrepancy Report (SDR) has been enclosed.

hr. 2 J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

08-29-97
Date

pefv:\group\data\pest\07L-501.pcb

002

Recra LabNet Philadelphia Sample Discrepancy Report (SDR) SDR #: 9466190

Initiator: BPastor RFW Batch: 9907L501 Parameter: OPCB
Date: 8/5/99 Samples: All Matrix: Soil
Client: TWU Hanford Method: SW846/MCAWW/CLP/ Prep Batch: 99LE0823

1. Reason for SDR

a. COC Discrepancy
__ Tech Profile Error __ Client Request __ Sampler Error on C-O-C
__ Transcription Error __ Wrong Test Code __ Other _____

b. General Discrepancy
__ Missing Sample/Extract __ Container Broken __ Wrong Sample Pulled __ Label ID's Illegible
__ Hold Time Exceeded __ Insufficient Sample __ Preservation Wrong __ Received Past Hold
__ Improper Bottle Type __ Not Amenable to Analysis

Note: Verified by [Log-In] or [Prep Group] (circle)...signature/date: _____

c. QC Problem (Include all relevant specific results; attach data if necessary)
The final CCU was increased 22% on the confirmation column only. The CCU before the samples was acceptable. The samples contained AR1254. All results were reported from the primary & within criteria column.

2. Known or Probable Causes(s) Sample Matrix - this is the second time the samples were analyzed with similar results.

3. Discussion and Proposed Action Other Description:
__ Re-log
__ Entire Batch
__ Following Samples: _____
__ Re-leach
__ Re-extract
__ Re-digest
__ Revise EDD
__ Change Test Code to _____
__ Place On/Take Off Hold (circle)

4. Project Manager Instructions...signature/date: Loretta G. Johnson 8/9/99
✓ Concur with Proposed Action
__ Disagree with Proposed Action; See Instruction
__ Include in Case Narrative
✓ Client Contacted:
Date/Person _____
__ Add
__ Cancel

5. Final Action...signature/date: [illegible] 8/10/99 Other Explanation:
__ Verified re-[log][leach][extract][digest][analysis] (circle)
__ Included in Case Narrative
__ Hard Copy COC Revised
__ Electronic COC Revised
__ EDD Corrections Completed

When Final Action has been recorded, forward original to QA Specialist for distribution and filing.

Route	Distribution of Completed SDR	Route	Distribution of Completed SDR
__	X Initiator	__	__ Metals: Doughty
__	X Lab Manager: M. Taylor	__	__ Inorganic: Perrone
✓	X Project Mgr: Stone/Carey/Schrenkel/Johnson	__	__ GC/LC: Schnell
__	X Section Mgr: Wesson/Daniels	__	__ MS: LeMin/Taylor
__	X QA (file): Racioppi	__	__ Log-in: Toder
__	__ Data Management: Feldman	__	__ Admin: Soos
__	__ Sample Prep: Schnell/Doughty/Kauffman	__	__ Other: _____

Bechtel Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B99-076-01	Page 1 of 1

Collector Fahlberg/Porter	Company Contact J Adler	Telephone No. 373-4316	Project Coordinator TRENT, SJ	Price Code 9K	Data Turnaround 15 Days
Project Designation 105-DR FSB - Concrete	Sampling Location 105-DR		SAF No. B99-076		
Ice Chest No. SML 534	Field Logbook No. EL 1281		Method of Shipment Fed Ex		
Shipped To ~~EMA~~/RECRA RS 7.20.99	Offsite Property No.		Bill of Lading/Air Bill No.		

COA R105D42870

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	Cool 4C	None	None							
	Type of Container	aG	aG	aG							
Special Handling and/or Storage	No. of Container(s) Volume	1 60mL	1 60mL	1 120mL							
SAMPLE ANALYSIS		PCBs - 8080	ICP Metals - 6010A (Add-on) (Lead); Mercury - 7471 - (CV)	See item (1) in Special Instructions							

Sample No.	Matrix *	Sample Date	Sample Time								
B0W0Y1	Other Solid	7.20.99	0855	X	X					tio to B0W0Y6	
B0W0Y2	Other Solid	7.20.99	0905	X	X						B0W0Y7
B0W0Y3	Other Solid	7.20.99	0920	X	X						B0W0Y8

0005

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix *
Relinquished By / Date/Time: R.Fahlberg/R.Fahlberg 7-20-99 1700	Received By / Date/Time: Raf 1-C 7.20.99 1500	(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Isotopic Plutonium; Isotopic Uranium; Americium-241; Strontium-89,90 – Total Sr; Technetium-99; Nickel-63; Carbon-14; Tritium - H3	Soil Water Vapor Other Solid Other Liquid
Relinquished By / Date/Time: Raf 2-C 7.22.99 0800	Received By / Date/Time: R.Fahlberg/R.Fahlberg 7-22-99 0800		
Relinquished By / Date/Time: R.Fahlberg/R.Fahlberg 7.23.99 1330	Received By / Date/Time: Fed Ex		
Relinquished By / Date/Time: !	Received By / Date/Time:		

LABORATORY SECTION	Received By: L.M. Mueller	Title:	Date/Time: 7/23/99 0930
FINAL SAMPLE DISPOSITION	Disposal Method:	Disposed By:	Date/Time:

Appendix 5

Data Validation Supporting Documentation

PESTICIDE/PCB DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 105 DR FSB QC			DATA PACKAGE: H0475		
VALIDATOR: ~~105 DR FS~~ TLF		LAB: RECRA		DATE: 10/11/89	
CASE:			SDG: H0475		
ANALYSES PERFORMED					
☐ CLP3/90	☐ SW-846 8080	☐ SW-846 8081	☒ 8082	☐	☐
SAMPLES/MATRIX	BOW041	BOW042	BOW043		
			solid		

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . Yes No (N/A)

Is a case narrative present? . . . . . (Yes) No N/A

Comments: _____

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments: _____

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

3.1 INSTRUMENT PERFORMANCE (METHOD 8080 AND 8081)

Are DDT retention times acceptable . . . . . Yes No (N/A)

Are calibration standard retention times acceptable? . . . . . Yes No (N/A)

Are DDT and endrin breakdowns acceptable? . . . . . Yes No (N/A)

PESTICIDE/PCB DATA VALIDATION CHECKLIST

Are DBC retention times acceptable? . . . . . Yes No N/A

Is the GC/MS tuning/performance check acceptable? . . . . . Yes No N/A

Comments:_____

3.2 CALIBRATIONS (METHOD 8080 AND 8081)

Are EVAL standard calibration factors and %RSD values acceptable? . . . . . Yes No N/A

Are quantitation column calibration factor %RSD values acceptable? . . . . . Yes No N/A

Were the analytical sequence requirements met? . . . . . Yes No N/A

Are continuing calibration %D values acceptable? . . . . . Yes No N/A

Comments:_____

3.3 INSTRUMENT PERFORMANCE AND INITIAL CALIBRATION (3/90 SOW)

Was the initial calibration sequence performed? . . . . . Yes No N/A

Was the resolution acceptable in the resolution check mix? . . Yes No N/A

Is resolution acceptable in the PEM, INDA and INDB? . . . . . Yes No N/A

Are DDT and Endrin breakdowns acceptable? . . . . . Yes No N/A

Are retention times in PEMs and calibration mixes acceptable? . Yes No N/A

Are RPD values in the PEMs acceptable? . . . . . Yes No N/A

Are %RSD values acceptable? . . . . . Yes No N/A

Comments:_____

3.4 CALIBRATION VERIFICATION (3/90 SOW)

Were the analytical sequence requirements met? . . . . . Yes No N/A

Is resolution acceptable in the PEMs? . . . . . Yes No N/A

Are initial calibrations acceptable? . . . . . Yes No N/A

PESTICIDE/PCB DATA VALIDATION CHECKLIST

Are retention times acceptable in the PEMs, INDA and INDB mixes?	Yes	No	N/A
Are RPD values in the PEMs acceptable?	Yes	No	N/A
Are the DDT and endrin breakdowns acceptable?	Yes	No	N/A
Was GPC cleanup performed?	Yes	No	N/A
Is the GPC calibration check acceptable?	Yes	No	N/A
Was Florisil cleanup performed?	Yes	No	N/A
Is the Florisil performance check acceptable?	Yes	No	N/A

Comments:

4. BLANKS

Were laboratory blanks analyzed?	Yes	No	N/A
Are laboratory blank results acceptable?	Yes	No	N/A
Were field/trip blanks analyzed?	Yes	No	N/A
Are field/trip blank results acceptable?	Yes	No	N/A

Comments:

5. ACCURACY

Were surrogates analyzed?	Yes	No	N/A
Are surrogate recoveries acceptable?	Yes	No	N/A
Were MS/MSD samples analyzed?	Yes	No	N/A
Are MS/MSD results acceptable?	Yes	No	N/A
Were LCS samples analyzed?	Yes	No	N/A
Are LCS results acceptable?	Yes	No	N/A

Comments: 42 + 43 - diluted out - J/UR

PESTICIDE/PCB DATA VALIDATION CHECKLIST

5. PRECISION

Are MS/MSD RPD values acceptable? . . . . . (Yes) No N/A
Are laboratory duplicate results acceptable? . . . . . Yes No (N/A)
Are field duplicate RPD values acceptable? . . . . . Yes No (N/A)
Are field split RPD values acceptable? . . . . . Yes No (N/A)
Comments:

7. SYSTEM PERFORMANCE

Is chromatographic performance acceptable? . . . . . Yes No (N/A)
Are positive results resolved acceptably? . . . . . Yes No (N/A)
Comments:

8. COMPOUND IDENTIFICATION AND QUANTITATION

Is compound identification acceptable? . . . . . Yes No (N/A)
Is compound quantitation acceptable? . . . . . Yes No (N/A)
Comments:

9. REPORTED RESULTS AND QUANTITATION LIMITS

Are results reported for all requested analyses? . . . . . (Yes) No N/A
Are all results supported in the raw data? . . . . . Yes No (N/A)
Do results meet the CRQLs? . . . . . Yes (No) N/A
Comments: JKC 42+43 - all but 1254 above

A-8

Date: 19 January 2000
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 105-DR FSB - Concrete
Subject: Inorganics - Data Package No. H0475-RLN (SDG No. H0475)

INTRODUCTION

This memo presents the results of data validation on Data Package No. H0475-RLN prepared by RECRA LabNet (RLN). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analysis
B0W0Y1	7/20/99	Solid	C	See note 1
B0W0Y2	7/20/99	Solid	C	See note 1
B0W0Y3	7/20/99	Solid	C	See note 1

1 - ICP metals by 6010B (lead); mercury by 7471A.

Data validation was conducted in accordance with the "Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils" (DOE/RL-99-35). Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

  Analytical holding times for metals are assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Samples must be analyzed within six (6) months for lead and 28 days for mercury.

  All holding times were acceptable.

- **Blanks**

  Preparation Blanks

  At least one preparation blank, consisting of deionized distilled water processed through each sample preparation and analysis procedure, must be prepared and analyzed with every sample delivery group. In the case of positive blank results, samples with digestate concentrations less than five times the preparation blank value have had their associated values qualified as non-detected and flagged "U". Samples with concentrations of greater than five times the highest blank concentration do not require qualification.

  In the case of negative blank results, if the absolute value exceeds the Contract Required Detection Limit (CRDL), all nondetects are rejected and flagged "UR" and all detects that are less than ten times the absolute value of the associated preparation blank result are qualified as estimates and flagged "J". If the absolute value of the negative preparation blank is greater than the IDL and less than or equal to the CRDL, all nondetects are qualified as estimates and flagged "UJ" and all detects less than ten times the absolute value of the blank are qualified as estimates and flagged "J". If the sample results are greater than ten times the absolute value of the preparation blank, no qualification is necessary.

  All preparation blank results were acceptable.

- **Accuracy**

  Matrix Spike

  Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within the range of 70% to 130%. Samples with a spike recovery of less than 30% and a sample result below the IDL are rejected and flagged "UR". Samples with a spike recovery of 30% to 69% and a sample result less than the IDL are qualified "UJ". Samples with a spike recovery of greater than 130% or less than 70% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a spike recovery greater than 130% and a sample result less than the IDL, no qualification is required.

  Due to a matrix spike recovery of 182%, all mercury results were qualified as estimates and flagged "J".

  All other matrix spike recovery results were acceptable.

- **Precision**

  Laboratory Duplicate Samples

  Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Results must be within RPD limits of plus or minus 30% for solid samples. If RPD values are out of specification and the sample concentration is greater than five times the CRDL, all associated sample results are qualified as estimated and flagged "J". If RPD values are plus or minus two times the CRDL and the sample concentration is less than five times the CRDL, all associated sample results are qualified as estimated and flagged "J/UJ". The performance criteria for aqueous laboratory duplicates are an RPD less than 20% for positive sample results greater than five times the CRDL or plus or minus the CRDL for positive sample results less than five times the CRDL. Sample results outside the criteria are qualified as estimates and flagged "J/UJ".

  Due to an RPD of 161%, all mercury results were qualified as estimates and flagged "J".

  All other laboratory duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the 105DR PQLs to ensure that laboratory detection levels meet the required criteria. All reported laboratory detection levels met the analyte specific PQL.

- **Completeness**

Data package No. H0475-RLN (SDG No. H0475) was submitted for validation and verified for completeness. The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to a matrix spike recovery of 182%, all mercury results were qualified as estimates and flagged "J". Due to an RPD of 161%, all mercury results were qualified as estimates and flagged "J". Data flagged "J" is an estimate, but under the BHI validation SOW, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error

associated with the methods.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-99-35, *Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils*.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with BHI validation SOW are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

BJ - Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making,purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H0475	REVIEWER: TLI	DATE: 1/19/00	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Mercury	J	All	Matrix spike
Mercury	J	All	RPD

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

INORGANIC ANALYSIS, SOLID MATRIX, MG/KG

Project: BECHTEL-HANFORD																			
Laboratory: RECRA LabNet																			
Case	SDG: H0475																		
Sample Number		B0W0Y1		B0W0Y2		B0W0Y3													
Location		A		C-1		C-1													
Remarks																			
Sample Date		7/20/99		7/20/99		7/20/99													
Inorganics	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Mercury	0.08	0.33	J	0.28	J	1.1	J												
Lead	20	29.0		60.3		45.4													

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 08/04/99

CLIENT: TNU-HANFORD B99-076

RECRA LOT #: 9907L501

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	B0W0Y1	Mercury, Total	0.33 J	MG/KG	0.02	1.0
		Lead, Total	29.0	MG/KG	3.4	1.0
-002	B0W0Y2	Mercury, Total	0.28 J	MG/KG	0.02	1.0
		Lead, Total	60.3	MG/KG	3.6	1.0
-003	B0W0Y3	Mercury, Total	1.1 J	MG/KG	0.02	1.0
		Lead, Total	45.4	MG/KG	3.4	1.0

10/18/99

~~0028~~

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

RECRA ENVIRONMENTAL INC.
Chemical and Environmental Measurement Information

Recra LabNet Philadelphia
Analytical Report

Client : TNU-HANFORD B99-076
RFW# : 9907L501
SDG/SAF# : H0475/B99-076

W.O.# : 10985-001-001-9999-00
Date Received: 07-23-99

METALS CASE NARRATIVE

1. This narrative covers the analyses of 3 solid samples.

2. The samples were prepared and analyzed in accordance with methods checked on the attached glossary.

3. All analyses were performed within the required holding times.

4. The cooler temperature has been recorded on the Chain of Custody.

5. All Initial and Continuing Calibration Verifications (ICV/CCVs) were within the 90-110% control limits (80-120% for Mercury).

6. All Initial and Continuing Calibration Blanks (ICB/CCBs) were within control limits (less than the PQL).

7. All preparation/method blanks (MB) were within method criteria {less than the Practical Quantitation Limit (3X the IDL or samples greater than 20X MB value}. Refer to the Inorganics Method Blank Data Summary.

8. All ICP Interference Check Standards were within control limits.

9. All laboratory control sample (LCS) were within the laboratory control limits. Refer to the Inorganics Laboratory Control Standards Report.

10. The matrix spike (MS) recovery for Mercury was outside the 75-125% control limits. Refer to the Inorganics Accuracy Report. When the MS is outside the control limits, a serial dilution is performed.

208 Welsh Pool Road • Lionville, PA 19341-1333 • (610) 280-3000 • Fax (610) 280-3041

11. The Mercury duplicate analysis was outside the 20% Relative Percent Difference (RPD) control limits. Refer to the Inorganics Precision Report.

12. For the purposes of this report, the data has been reported to the Instrument Detection Limit (IDL). Values between the IDL and the Practical Quantitation Limit (PQL) are acquired in a region of less-certain quantification.

Pat E

J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

8-4-99
Date

mld/m07-501

Collector	Company Contact	Telephone No.	Project Coordinator	Price Code	Data Turnaround
Fahlberg/Porter	J Adler	373-4316	TRENT, SJ	9K	15 Days
Project Designation	**Sampling Location**		**SAF No.**		
105-DR FSB - Concrete	105-DR		B99-076		
Ice Chest No.	**Field Logbook No.**		**Method of Shipment**		
SML 534	EL 1281		Fed Ex		
Shipped To	**Offsite Property No.**		**Bill of Lading/Air Bill No.**		
~~HMMRECRA~~ RS 7.20.99					

COA 105D42870

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	Cool 4C	None	None									
Type of Container	aG	aG	aG									
No. of Container(s) / **Volume**	1 / 60mL	1 / 60mL	1 / 120mL									
SAMPLE ANALYSIS	PCBs - 8080	ICP Metals - 6010A (Add-on) (Lead); Mercury - 7471 - (CV)	See Item (1) in Special Instructions									

Sample No.	Matrix *	Sample Date	Sample Time									
B0W0Y1	Other Solid	7.20.99	0855	X	X						Field Blank	
B0W0Y2	Other Solid	7.20.99	0905	X	X						Row 0Y7	
B0W0Y3	Other Solid	7.20.99	0920	X	X						Row 0Y8	

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By	Date/Time	Received By	Date/Time
R.Fahlberg/R.Fahlberg	7.20.99 1700	Ref 1-C	7.20.99 1800
Ref 1-C	7.22.99 0800	R.Fahlberg/R.Fahlberg	7-22-99 0800
R.Fahlberg/R.Fahlberg	7.22.99 1330	Fed Ex	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Isotopic Plutonium; Isotopic Uranium; Americium-241; Strontium-89,90 -- Total Sr; Technetium-99; Nickel-63; Carbon-14; Tritium - H3

Matrix *

Soil
Water
Vapor
Other Solid
Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time 7/23/99 0930
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

0012

Appendix 5

Data Validation Supporting Documentation

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 105DR FSB concrete			DATA PACKAGE: H0475		
VALIDATOR: TLI		LAB: Recra		DATE: 10/18/97	
CASE:			SDG: H0475		

ANALYSES PERFORMED					
☐ CLP/ICP	☐ CLP/GFAA	☐ CLP/Hg	☐ CLP/Cyanide	☐	☐
☒ SW-846/ICP	☐ SW-846/GFAA	☒ SW-846/Hg	☐ SW-846 Cyanide	☐	☐

SAMPLES/MATRIX - B0W041 B0W042 B0W043

solid

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . Yes No (N/A)

Is a case narrative present? . . . . . (Yes) No N/A

Comments: _____

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments: _____

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

Were initial calibrations performed on all instruments?	Yes	No	N/A
Are initial calibrations acceptable?	Yes	No	N/A
Are ICP interference checks acceptable?	Yes	No	N/A
Were ICV and CCV checks performed on all instruments?	Yes	No	N/A
Are ICV and CCV checks acceptable?	Yes	No	N/A

Comments:

4. BLANKS

Were ICB and CCB checks performed for all applicable analyses?	Yes	No	N/A
Are ICB and CCB results acceptable?	Yes	No	N/A
Were preparation blanks analyzed?	Yes	No	N/A
Are preparation blank results acceptable?	Yes	No	N/A
Were field/trip blanks analyzed?	Yes	No	N/A
Are field/trip blank results acceptable?	Yes	No	N/A

Comments:

5. ACCURACY

Were spike samples analyzed?	Yes	No	N/A
Are spike sample recoveries acceptable?	Yes	No	N/A
Were laboratory control samples (LCS) analyzed?	Yes	No	N/A
Are LCS recoveries acceptable?	Yes	No	N/A

Comments: 182 Tc for Hg J all (all detected)

A-282

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

6. PRECISION

Were laboratory duplicates analyzed?	Yes	No	N/A
Are laboratory duplicate samples RPD values acceptable?	Yes	No	N/A
Were ICP serial dilution samples analyzed?	Yes	No	N/A
Are ICP serial dilution %D values acceptable?	Yes	No	N/A
Are field duplicate RPD values acceptable?	Yes	No	N/A
Are field split RPD values acceptable?	Yes	No	N/A

Comments: Hg 16170 rpd

7. FURNACE AA QUALITY CONTROL

Were duplicate injections performed as required?	Yes	No	N/A
Are duplicate injection %RSD values acceptable?	Yes	No	N/A
Were analytical spikes performed as required?	Yes	No	N/A
Are analytical spike recoveries acceptable?	Yes	No	N/A
Was MSA performed as required?	Yes	No	N/A
Are MSA results acceptable?	Yes	No	N/A

Comments:

8. REPORTED RESULTS AND DETECTION LIMITS

Are results reported for all requested analyses?	Yes	No	N/A
Are all results supported in the raw data?	Yes	No	N/A
Are results calculated properly?	Yes	No	N/A
Do results meet the CRDLs?	Yes	No	N/A

Comments:

Recra LabNet - Lionville

INORGANICS ACCURACY REPORT 08/04/99

CLIENT: TWU-HANFORD B99-076 RECRA LOT #: 9907L501

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
-001	B0W0Y1	Mercury, Total	0.70	0.33	0.20	181.9	1.0
		Lead, Total	82.2	29.0	61.3	86.8	1.0

Recra LabNet - Lionville

INORGANICS PRECISION REPORT 08/04/99

CLIENT: TNU-HANFORD B99-076 RECRA LOT #: 9907L501

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-001REP	B0W0Y1	Mercury, Total	0.33	3.1	161.3	5.0
		Lead, Total	29.0	33.4	14.1	1.0

Date: 19 January 2000
To: Bechtel Hanford, Inc. (technical representative)
From: TechLaw, Inc.
Project: 105-DR FSB - Concrete
Subject: Radiochemistry - Data Package No. H0475-TNU (SDG No. H0475)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H0475-TNU which was prepared by Thermo NUtech (TNU). A list of samples validated along with the analyses reported and the requested analytes is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analysis
B0W0X9	07/19/99	Solid	C	See note1
B0W0Y0	07/19/99	Solid	C	See note 1

1 - Gamma spectroscopy; alpha spectroscopy (isotopic uranium, isotopic plutonium and americium-241); total strontium; nickel-63; tritium; carbon-14; technetium-99.

Data validation was conducted in accordance with the "Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils" (DOE/RL-99-35). Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

  Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for radiochemical analysis is 6 months with liquid scintillation requiring analysis within 7 days of distillation.

  All holding times were acceptable.

- **Blanks**

  Laboratory Blanks

  Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicate the presence of an analyte above the MDA, the following qualifiers are applied: All positive sample results less than five times the highest blank concentration are qualified as estimates and flagged "J"; sample results below the MDA are qualified as undetected and flagged "U"; sample results above the MDA and greater than five times the highest blank concentration are not qualified.

  All laboratory blank results were acceptable.

- **Accuracy**

  Accuracy is evaluated by analyzing distilled water or field samples spiked with known amounts of radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable laboratory control sample and matrix spike recovery is 70-130% (80-120% for gamma spectroscopy). In addition, samples may be spiked with a radiochemical tracer to assist in isolating the radioisotope of interest with the yield of the tracer being used in calculating sample activity. The acceptable range for tracer recovery is 20% to 105%. Spike sample results outside the above ranges result in associated sample results being qualified as estimates, rejected, or not qualified, depending on the activity of the individual sample.

  All accuracy results were acceptable.

- **Precision**

  Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. Precision may also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the CRDL and the RPD is less than 30 percent, the results are acceptable. If either activities are less then five times the CRDL, a control limit of less than or equal to two times the CRDL is used for soil samples and less than or equal to the CRDL for water samples. If either the original or replicate value is below the CRDL, the applicable control limits are less than or equal to the CRDL for water samples and less than or equal to two times the CRDL for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

All duplicate results were acceptable.

- **Detection Levels**

  Reported analytical detection levels are compared against the 105DR PQLs to ensure that laboratory detection levels meet the required criteria. All reported laboratory MDAs were at or below the analyte-specific TDL.

- **Completeness**

  Data Package No. H0475 (SDG No. H0475) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-99-35, *Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils.*

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the BHI statement of work are as follows:

U - Indicates the compound or analyte was analyzed for and not detected above the minimum detectable activity (MDA) in the sample. The value reported is the sample result corrected for sample dilution and moisture content by the laboratory. The data is usable for decision making purposes.

UJ - Indicates the compound or analyte was analyzed for and not detected at concentrations above the minimum detectable activity (MDA) in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate, but is usable for decision making purposes.

J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H0475	REVIEWER: TLI	DATE: 1/19/00	PAGE 1 OF 1
COMMENTS: No qualifiers assigned			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

RADIOCHEMISTRY ANALYSIS, SOIL MATRIX, (PCi/G)

Project: BECHTEL-HANFORD																			
Laboratory: TNU																			
Case	SDG: H0475																		
Sample Number		B0W0X9		B0W0Y0															
Location		B		D															
Remarks																			
Sample Date		07/19/99		07/19/99															
Radiochemistry	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Tritium		6.23		8.09															
Carbon-14	56	540		961															
Technetium-99	15	1.37		0.438															
Uranium-233/234	1	3.10		1.37															
Uranium-235	1	0.321		0.059															
Uranium-238	1	3.19		1.21															
Plutonium-238	1	5.77		6.63															
Plutonium-239/40	1	358		240															
Nickel-63	30	5360		11900															
Americium-241	1	54.7		72.0															
Strontium (total)	1	4500		1980															
Potassium-40		U	U	U	U														
Barium-133		U	U	U	U														
Cobalt 60	0.1	323		596															
Cesium 137	0.1	5070		5140															
Europium 152	0.2	806		2810															
Europium 154	0.2	105		518															
Europium 155	0.1	4.38		21.5															
Radium-226		U	U	U	U														
Radium-228		U	U	U	U														
Thorium-228		U	U	U	U														
Thorium-232		U	U	U	U														
Americium-241 (GEA)		60.0	U	119															
Uranium-238 (GEA)		U	U	U	U														
Uranium-235 (GEA)		U	U	U	U														

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0475

N907145-01 B0W0X9

DATA SHEET

SDG	7166	Client/Case no	Hanford SDG-H0475
Contact	L.A. Johnson	Contract	TRB-SBB-207925
Lab sample id	N907145-01	Client sample id	B0W0X9
Dept sample id	7166-001	Location/Matrix	105-DR SOLID
Received	07/23/99	Collected	07/19/99 10:15
% solids	100.0	Custody/SAF No	B99-076-01 B99-076

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	6.23	0.17	0.087	400	J	H
Carbon 14	14762-75-5	540	8.6	4.4	50		C
Technetium 99	14133-76-7	1.37	0.51	0.88	15	J	TC
Uranium 233/234	U-233/234	3.10	0.33	0.080	1.0		U
Uranium 235	15117-96-1	0.321	0.091	0.048	1.0	J	U
Uranium 238	U-238	3.19	0.34	0.075	1.0		U
Plutonium 238	13981-16-3	5.77	0.50	0.031	1.0		PU
Plutonium 239/240	PU-239/240	358	24	0.050	1.0	B	PU
Nickel 63	13981-37-8	5360	54	5.3	30		NI_L
Americium 241	14596-10-2	54.7	11	0.34	1.0		AM
Total Strontium	SR-RAD	4500	9.0	0.27	1.0		SR
Potassium 40	13966-00-2	U		7.3		U	GAM
Barium 133	13981-41-4	U		2.6		UX	GAM
Cobalt 60	10198-40-0	323	2.5	1.1	0.050		GAM
Cesium 137	10045-97-3	5070	7.0	2.5	0.10		GAM
Europium 152	14683-23-9	806	6.4	7.1	0.10		GAM
Europium 154	15585-10-1	105	3.9	3.4	0.10		GAM
Europium 155	14391-16-3	4.38	2.9	4.0	0.10		GAM
Radium 226	13982-63-3	U		3.2	0.10	U	GAM
Radium 228	15262-20-1	U		7.2	0.20	U	GAM
Thorium 228	14274-82-9	U		2.8		U	GAM
Thorium 232	TH-232	U		7.2		U	GAM
Americium 241	14596-10-2	60.0	1.6	2.2			GAM
Uranium 238	U-238	U		250		U	GAM
Uranium 235	15117-96-1	U		5.8		U	GAM

105-DR FSB-Concrete

1/18/00

DATA SHEETS
Page 1
SUMMARY DATA SECTION
Page 15

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 10/07/99

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0475

N907145-02 B0W0Y0

DATA SHEET

SDG 7166 Client/Case no Hanford SDG-H0475
Contact L.A. Johnson Contract TRB-SBB-207925

Lab sample id N907145-02 Client sample id B0W0Y0
Dept sample id 7166-002 Location/Matrix 105-DR SOLID
Received 07/23/99 Collected 07/19/99 10:45
% solids 100.0 Custody/SAF No B99-076-01 B99-076

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	8.09	0.19	0.085	400	J	H
Carbon 14	14762-75-5	961	12	5.0	50		C
Technetium 99	14133-76-7	0.438	0.35	0.66	15	U	TC
Uranium 233/234	U-233/234	1.37	0.22	0.054	1.0		U
Uranium 235	15117-96-1	0.059	0.051	0.065	1.0	U	U
Uranium 238	U-238	1.21	0.20	0.054	1.0		U
Plutonium 238	13981-16-3	6.63	0.52	0.063	1.0		PU
Plutonium 239/240	PU-239/240	240	15	0.027	1.0	B	PU
Nickel 63	13981-37-8	11900	120	8.1	30		NI_L
Americium 241	14596-10-2	72.0	14	0.30	1.0		AM
Total Strontium	SR-RAD	1980	4.7	0.17	1.0	B	SR
Potassium 40	13966-00-2	U		11		U	GAM
Barium 133	13981-41-4	U		3.0		UX	GAM
Cobalt 60	10198-40-0	596	3.3	1.8	0.050		GAM
Cesium 137	10045-97-3	5140	7.0	2.6	0.10		GAM
Europium 152	14683-23-9	2810	10	9.7	0.10		GAM
Europium 154	15585-10-1	518	7.1	6.2	0.10		GAM
Europium 155	14391-16-3	21.5	4.3	6.3	0.10		GAM
Radium 226	13982-63-3	U		4.7	0.10	U	GAM
Radium 228	15262-20-1	U		9.9	0.20	U	GAM
Thorium 228	14274-82-9	U		3.3		U	GAM
Thorium 232	TH-232	U		9.9		U	GAM
Americium 241	14596-10-2	119	5.5	7.5			GAM
Uranium 238	U-238	U		340		U	GAM
Uranium 235	15117-96-1	U		7.0		U	GAM

105-DR FSB-Concrete

11/18/00

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 10/07/99

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Case Narrative

1.0 GENERAL

Bechtel Hanford Inc. Sample Delivery Group H0475 is composed of two solid samples designated under SAF No. B99-076 with a Project Designation of : 105-DR FSB-Concrete.

The sample was received as stated on the Chain-of-Custody document. Any discrepancies are noted on the TNU Sample Receipt Checklist. The results were transmitted to BHI via facsimile on August 19, 1999.

2.0 ANALYSIS NOTES

2.1 Gamma Scan Analyses

No problems were encountered during the course of the analyses.

2.2 Total Strontium Analyses

The RPD in the duplicate result and the original was 28%, greater than the 3 sigma total limit of 22%. The blank sample indicated slight cross contamination from the high activity of the samples.

2.3 Americium-241 Analyses

No problems were encountered during the course of the analyses although all client samples, the duplicate and the LCS sample were recounted.

2.4 Isotopic Plutonium Analyses

No problems were encountered during the course of the analyses although all client samples and the duplicate were recounted.

2.5 Nickel-63 Analyses

No problems were encountered during the course of the analyses.

2.6 Isotopic Uranium Analyses

No problems were encountered during the course of the analyses, although sample BOWOX9 was recounted.

2.7 Carbon-14 Analyses

The RPD in the duplicate result and the original was 23%, slightly greater than the 3 sigma total limit of 22%.

2.8 Tritium Analyses

No problems were encountered during the course of the analyses.

2.9 Technetium-99 Analyses

The RPD in the duplicate result and the original was 59%, slightly greater than the 3sigma total limit of 58%.

Bechtel Hanford Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

B99-076-01

Collector: F ahlberg/Porter	Company Contact: J Adler	Telephone No.: 373-4316	Project Coordinator: TRENT, SJ
Project Designation: 105-DR FSB - Concrete	Sampling Location: 105-DR		SAF No.: B99-076
Ice Chest No.: ERC 99-005	Field Logbook No.: EL 1281		Method of Shipment: Fed Ex
Shipped To: TMA/RECRA JRS 7.19.99	Offsite Property No.		Bill of Lading/Air Bill No.

Price Code 9K — Data Turnaround 15 Days

COA R105D42870

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	Cool 4C	None	None									
Type of Container	sG	sG	sG									
No. of Container(s) / Volume	1 / 60mL	1 / 60mL	1 / 120mL									
SAMPLE ANALYSIS	PCBs - 8080	ICP Metals - 6010A (Add-on) (Lead); Mercury - 7471 - (CV)	See item (1) in Special Instructions.									

Sample No.	Matrix *	Sample Date	Sample Time									
B0W0X9	Other Solid	7.19-99	1015			X				triplo	B0W0Y4	
B0W0Y0	Other Solid	7.19.99	1045			X					B0W0Y5	
B0W0Y1 RF 7.19.99	Other Solid											
B0W0Y2 RF 7.19.99	Other Solid											
B0W0Y3 RF 7.19.99	Other Solid											

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
R.F. Ahlberg / R.F. Ahlberg	7.19.99 1700	R.F. 2-C	7.19.99 1700
R.F. 2-C	7-22-99 0800	R. Ahlberg / R.F. Ahlberg	7.22.99 0800
R. Ahlberg / R.F. Ahlberg	7.22.99 1336	Fed Ex	7/22/99
Fed Ex	7-23-99 10:30	TNV M. Goldenberg	7-23-99 10:00

SPECIAL INSTRUCTIONS

(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155) Isotopic Plutonium Isotopic Uranium Americium-241 Strontium-89,90 – Total Sr Technetium-99 Nickel-63 Carbon-14 Tritium - H3

Matrix *: Soil, Water, Vapor, Other Solid, Other Liquid

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Appendix 5

Data Validation Supporting Documentation

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 105DR FSB Concrete			DATA PACKAGE: H0475		
VALIDATOR:		LAB: TNU		DATE: 10/7/99	
CASE:			SDG: H0475		

ANALYSES PERFORMED

☐ Gross Alpha/Beta	☒ Strontium-90	☒ Technetium-99	☐ Alpha Spectroscopy	☒ Gamma Spectroscopy	
☐ Total Uranium	☐ Radium-22	☒ Tritium	☒ C14	X N/A	

SAMPLES/MATRIX B0W0X7 B0W0Y0

Salad

1. Completeness . . . . . ☒ N/A

Technical verification forms present? . . . . . Yes No N/A

Comments:

2. Initial Calibration . . . . . ☒ N/A

Instruments/detectors calibrated within one year of sample analysis? . . . . . Yes No N/A

Initial calibration acceptable? . . . . . Yes No N/A

Standards NIST traceable? . . . . . Yes No N/A

Standards Expired? . . . . . Yes No N/A

Comments:

3. Continuing Calibration . . . . . ☒ N/A

Calibration checked within one week of sample analysis? . . .	Yes	No	N/A
Calibration check acceptable?	Yes	No	N/A
Calibration check standards NIST traceable?	Yes	No	N/A
Calibration check standards expired?	Yes	No	N/A

Comments:

4. Blanks . . . . . ☐ N/A

Method blank analyzed?	(Yes)	No	N/A
Method blank results acceptable?	(Yes)	No	N/A
Analytes detected in method blank?	(Yes)	No	N/A
Field blank(s) analyzed?	Yes	(No)	N/A
Field blank results acceptable?	Yes	No	(N/A)
Analytes detected in field blank(s)?	Yes	No	(N/A)
Transcription/Calculation Errors?	Yes	No	(N/A)

Comments: ok dat + om Pu 239 SR-90 ok CO60 CS137 EU152/154/155
Am 241 (gpc) U238 (gpc) U235 ~~gpc~~ om TDL
No qual rqd.

5. Matrix Spikes . . . . . ☐ N/A

Matrix spike analyzed?	Yes	No	N/A
Spike recoveries acceptable?	Yes	No	N/A
Spike source traceable?	Yes	No	N/A
Spike source expired?	Yes	No	N/A
Transcription/Calculation Errors?	Yes	No	N/A

Comments: IR

6. Laboratory Control Samples . . . . . ☐ N/A

LCS analyzed?	(Yes)	No	N/A
LCS recoveries acceptable?	(Yes)	(No)	N/A
LCS traceable?	Yes	No	(N/A)
Transcription/Calculation Errors?	Yes	No	(N/A)

Comments: U233/34 J 82% vs 85% 3Ge

7. Chemical Recovery . . . . . ☐ N/A

Chemical carrier added?	(Yes)	No	N/A
Chemical recovery acceptable?	(Yes)	No	N/A
Chemical carrier traceable?	Yes	No	(N/A)
Chemical carrier expired?	Yes	No	(N/A)
Transcription/Calculation errors?	Yes	No	(N/A)

Comments:

8. Duplicates . . . . . ☐ N/A

Duplicates Analyzed?	(Yes)	No	N/A
RPD Values Acceptable?	Yes	(No)	N/A
Transcription/Calculation Errors?	Yes	No	(N/A)

Comments: ~~Tc 99 57%~~ J
C14 ~~23%~~

9. Field QC Samples . . . . . ☐ N/A

Field duplicate sample(s) analyzed? . . . . . Yes (No) N/A
Field duplicate RPD values acceptable? . . . . . Yes No (N/A)
Field split sample(s) analyzed? . . . . . Yes (No) N/A
Field split RPD values acceptable? . . . . . Yes No (N/A)
Performance audit sample(s) analyzed? . . . . . Yes (No) N/A
Performance audit sample results acceptable? . . . . . Yes No (N/A)

Comments: _____

10. Holding Times

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments: _____

11. Results and Detection Limits (Levels D & E) . . . . . ☐ N/A

Results reported for all required sample analyses? . . . . . (Yes) No N/A
Results supported in raw data? . . . . . Yes No (N/A)
Results Acceptable? . . . . . (Yes) No N/A
Transcription/Calculation errors? . . . . . Yes No (N/A)
MDA's meet required detection limits? . . . . . (Yes) (No) N/A
Transcription/calculation errors? . . . . . Yes No (N/A)

Comments: ~~Eu-152 Cs137 all OK~~ ~~Am241(gr)~~ ~~U238(gr)~~ ~~U235(gr)~~ Wash

AA2

075769

Job No. 22192
Written Response Required: NO
Due Date: N/A
Actionee: N/A
Closes CCN: N/A
OU: N/A
TSD: N/A
ERA: N/A
Subject Code: 8620

Environmental Restoration Contractor **ERC Team**

Interoffice Memorandum

TO: J.G. Adler X5-53
R.S. Day X5-53
M.R. Morton X9-08

DATE: January 24, 2000

COPIES: J.M. Duncan H9-03
Document and Info Services H0-09

FROM: R.L. Weiss RLW
Sample Management
H9-03/372-9592

SUBJECT: **VALIDATION OF POLYCHLORINATED BIPHENYLS (PCB) ANALYSIS FOR SAMPLE DELIVERY GROUPS (SDG) H0475 & H0483**

Analysis for PCBs was performed on samples in SDGs H0475 & H0483. During analysis, levels of one PCB mixture (Aroclor-1254) were determined initially above the upper calibration range for three samples (SDG H0475 – B0W0Y2 & B0W0Y3, SDG H0483 – B0W3Y6). In order to bring the analytical solution within the instrument calibration range for this Aroclor, a 10-fold dilution of the primary solutions were performed. This dilution has resulted in inappropriate validation parameters being applied to the non—detect results reported for these samples.

One component of quality control (QC) associated with analysis of PCBs includes addition of "surrogate" compounds to the sample prior to any sample preparation for analysis. Surrogate materials are expected to follow through sample preparation and analysis very similarly to the target compounds. Poor or non-recovery of the surrogates may indicate potential failure of the methodology to determine presence and concentrations of the target compounds. Because surrogates are very similar to the materials they mimic, surrogates are added (spiked) at levels within the normal calibration range for the target compounds. Most often, spiking levels are only 5 to 10 times the method detection limits (this gives the most "robust" data when attempting to establish non-detection for compounds). When the primary sample preparation must be diluted, the resulting levels of surrogate compound may be reduced below the detection limit of the equipment. This occurred in the analysis of the samples noted above.

The current validation procedure ("Data Validation Procedures for Chemical Analysis", WHC-SD-EN-WPP-002) used by the ERC to validate PCB analysis does not correctly address validation when the primary sample preparation must be diluted before final analysis. The wording of the procedure is:

> "Qualify all associated detected results as estimated (J) and non-detects as unusable (R) for surrogate recoveries <10%"

Application of this requirement on the data for sample B0W3Y6, B0W0Y2 AND B0W0Y3 resulted in applying the "J" flag to the Aroclor-1254 result and "R" flag to all others (non-detects).

The procedure used for ERC data is based on the "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", EPA540/R94/012. This document provides different guidance when validating PCB data when sample dilution is required. The wording of that document is:

> "If low surrogate recoveries are found to be due to sample dilution, then professional judgement should be used to determine if the resulting data should be qualified. If sample dilution is not a factor, then detected target compounds may be qualified "J" and non-detected target compound results should be qualified unusable (R)."

The error in the procedure will be corrected as part of ongoing revision activities planned for the validation procedures occurring this year.

The non-detect results for samples B0W0Y2, B0W0Y3, & B0W3Y6 should not be considered to be unusable. The methodology has demonstrated the ability to detect Aroclor-1254. The presence of this PCB mixture has raised the detection limits for the other Aroclors, but should still be adequate to detect these materials if present. The "J" qualifier (estimated result but useable) is more appropriate for all PCB results for these samples.

RLW:dmr

REVIEW OF VALIDATION PACKAGES – R.L. WEISS - JAN. 20, 2000

105-DR FSB

SDG H0544 – Inorganic, Radiochemistry, & PCB packages: no comment, OK

SDG H0475 – Inorganic, Radiochemistry, & PCB packages: no comment, OK

Review Comment Record (RCR)

1. Date	2. Review No.
1/2500	BHI/QA0011
3. Project	4. Page
105-DR	Page 1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
SDG No. H0475	105-DR FSB - Concrete	Claude Stacey	BHI/QA	H0-16/372-9208

17. Comment Submittal Approval:

10. Agreement with indicated comment disposition(s)

11. CLOSED

Organization Manager (Optional)	Date	Reviewer/Point of Contact	Date	Reviewer/Point of Contact
		Author/Originator		Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1	All: OK No Comments			
2				
3				

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 17 January 2000

Information Request

110475 - Rad

The new rad pages you sent me list the sample matrix as liquid versus solid everywhere else in the package.

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 17 January 2000

Information Request

110475 - Rad

The new rad pages you sent me list the sample matrix as liquid versus solid everywhere else in the package.

Replacement tables attached

RLW 1-18-00

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0475

N907145-04 Method Blank

METHOD BLANK

SDG 7166 Client/Case no Hanford SDG-H0475
Contact L.A. Johnson Contract TRB-SBB-207925

Lab sample id N907145-04 Client sample id Method Blank
Dept sample id 7166-004 Material/Matrix SOLID
SAF No B99-076

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Tritium	10028-17-8	0.006	0.051	0.086	400	U	H
Technetium 99	14133-76-7	0.497	0.31	0.70	15	U	TC
Uranium 233/234	U-233/234	0.010	0.019	0.073	1.0	U	U
Uranium 235	15117-96-1	0	0.023	0.088	1.0	U	U
Uranium 238	U-238	0.010	0.019	0.073	1.0	U	U
Plutonium 238	13981-16-3	0	0.031	0.064	1.0	U	PU
Plutonium 239/240	PU-239/240	0.089	0.053	0.058	1.0	J	PU
Nickel 63	13981-37-8	-3.38	2.1	4.1	30	U	NI_L
Americium 241	14596-10-2	0.008	0.016	0.030	1.0	U	AM
Total Strontium	SR-RAD	0.248	0.14	0.18	1.0	J	SR
Potassium 40	13966-00-2	U		0.95		U	GAM
Barium 133	13981-41-4	U		0.057		UX	GAM
Cobalt 60	10198-40-0	U		0.061	0.050	U	GAM
Cesium 137	10045-97-3	U		0.059	0.10	U	GAM
Europium 152	14683-23-9	U		0.16	0.10	U	GAM
Europium 154	15585-10-1	U		0.17	0.10	U	GAM
Europium 155	14391-16-3	U		0.14	0.10	U	GAM
Radium 226	13982-63-3	U		0.11	0.10	U	GAM
Radium 228	15262-20-1	U		0.38	0.20	U	GAM
Thorium 228	14274-82-9	U		0.081		U	GAM
Thorium 232	TH-232	U		0.38		U	GAM
Americium 241	14596-10-2	U		0.17		U	GAM
Uranium 238	U-238	U		6.6		U	GAM
Uranium 235	15117-96-1	U		0.18		U	GAM

105-DR FSB-Concrete

QC-BLANK 31424

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 10/07/99

N907145-07 Method Blank

METHOD BLANK

SDG	7166	Client/Case no	Hanford SDG-H0475
Contact	L.A. Johnson	Contract	TRB-SBB-207925
Lab sample id	N907145-07	Client sample id	Method Blank
Dept sample id	7166-007	Material/Matrix	SOLID
		SAF No	B99-076

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Carbon 14	14762-75-5	1.95	2.7	4.5	50	U	C

105-DR FSB-Concrete

QC-BLANK 31578

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	10/07/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0475

N907145-03 Lab Control Sample

LAB CONTROL SAMPLE

SDG 7166 Client/Case no Hanford SDG-H0475

Contact L.A. Johnson Case no TRB-SBB-207925

Lab sample id N907145-03 Client sample id Lab Control Sample

Dept sample id 7166-003 Material/Matrix SOLID

SAF No B99-076

ANALYTE	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST	ADDED pCi/g	2σ ERR pCi/g	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Tritium	4.58	0.15	0.086	400	J	H	4.93	0.20	93	84-116	80-120
Technetium 99	67.0	2.1	0.66	15		TC	68.4	2.7	98	84-116	80-120
Uranium 233/234	3.76	0.45	0.23	1.0		U	4.64	0.19	81	83-117	80-120
Uranium 235	3.12	0.40	0.065	1.0		U	3.77	0.15	83	82-118	80-120
Uranium 238	4.17	0.48	0.22	1.0		U	5.04	0.20	83	83-117	80-120
Plutonium 238	9.73	0.89	0.054	1.0		PU	10.0	0.40	97	84-116	80-120
Plutonium 239/240	10.2	0.92	0.054	1.0	B	PU	10.6	0.42	96	84-116	80-120
Nickel 63	128	4.3	2.8	30		NI_L	134	5.4	96	84-116	
Americium 241	18.8	1.3	0.034	1.0		AM	19.2	0.77	98	86-114	80-120
Total Strontium	13.2	1.1	0.89	1.0		SR	11.4	0.46	116	77-123	
Cobalt 60	3.95	0.21	0.099	0.050		GAM	4.10	0.16	96	76-124	80-120
Cesium 137	3.70	0.17	0.12	0.10		GAM	3.72	0.15	99	76-124	80-120

105-DR FSB-Concrete

QC-LCS 31423

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-LCS
Version 3.06
Report date 10/07/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0475

N907145-06 Lab Control Sample

LAB CONTROL SAMPLE

SDG 7166 Client/Case no Hanford SDG-H0475

Contact L.A. Johnson Case no TRB-SBB-207925

Lab sample id N907145-06 Client sample id Lab Control Sample

Dept sample id 7166-006 Material/Matrix SOLID

SAF No B99-076

ANALYTE	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST	ADDED pCi/g	2σ ERR pCi/g	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Carbon 14	10400	100	13	50		C	10800	430	96	84-116	

105-DR FSB-Concrete

QC-LCS 31577

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-LCS
Version 3.06
Report date 10/07/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0475

N907145-05 B0W0X9

DUPLICATE

SDG 7166 Client/Case no Hanford SDG-H0475

Contact L.A. Johnson Case no TRB-SBB-207925

DUPLICATE		ORIGINAL			
Lab sample id	N907145-05	Lab sample id	N907145-01	Client sample id	B0W0X9
Dept sample id	7166-005	Dept sample id	7166-001	Location/Matrix	105-DR SOLID
		Received	07/23/99	Collected	07/19/99 10:15
		% solids	100.0	Custody/SAF No	B99-076-01 B99-076

ANALYTE	DUPLICATE pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST	ORIGINAL pCi/g	2σ ERR (COUNT)	MDA pCi/g	QUALI-FIERS	RPD %	3σ PROT TOT LIMIT
Tritium	7.52	0.19	0.085	400	J	H	6.23	0.17	0.087	J	19	22
Technetium 99	2.51	0.48	0.84	15	J	TC	1.37	0.51	0.88	J	59	58
Uranium 233/234	3.33	0.41	0.093	1.0		U	3.10	0.33	0.080		7	27
Uranium 235	0.282	0.11	0.070	1.0	J	U	0.321	0.091	0.048	J	13	72
Uranium 238	2.90	0.38	0.083	1.0		U	3.19	0.34	0.075		10	27
Plutonium 238	5.32	0.44	0.029	1.0		PU	5.77	0.50	0.031		8	21
Plutonium 239/240	358	23	0.029	1.0	B	PU	358	24	0.050	B	0	18
Nickel 63	5330	53	5.4	30		NI_L	5360	54	5.3		1	21
Americium 241	49.8	4.0	0.050	1.0		AM	54.7	11	0.34		9	35
Total Strontium	5970	150	8.8	1.0		SR	4500	9.0	0.27		28	22
Potassium 40	U		7.2		U	GAM	U		7.3	U	-	
Barium 133	U		2.6		UX	GAM	U		2.6	UX	-	
Cobalt 60	323	2.5	1.0	0.050		GAM	323	2.5	1.1		0	32
Cesium 137	5070	7.0	2.5	0.10		GAM	5070	7.0	2.5		0	32
Europium 152	801	7.0	7.7	0.10		GAM	806	6.4	7.1		1	32
Europium 154	108	4.2	3.7	0.10		GAM	105	3.9	3.4		3	33
Europium 155	5.03	2.2	3.5	0.10		GAM	4.38	2.9	4.0		14	120
Radium 226	U		3.2	0.10	U	GAM	U		3.2	U	-	
Radium 228	U		7.3	0.20	U	GAM	U		7.2	U	-	
Thorium 228	U		2.4		U	GAM	U		2.8	U	-	
Thorium 232	U		7.3		U	GAM	U		7.2	U	-	
Americium 241	60.2	1.8	2.4			GAM	60.0	1.6	2.2		0	32
Uranium 238	U		260		U	GAM	U		250	U	-	
Uranium 235	U		5.9		U	GAM	U		5.8	U	-	

105-DR FSB-Concrete

QC-DUP#1 31425

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DUP
Version 3.06
Report date 10/07/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0475

N907145-08

B0W0X9

DUPLICATE

SDG	7166			Client/Case no	Hanford SDG-H0475
Contact	L.A. Johnson			Case no	TRB-SBB-207925
	DUPLICATE		ORIGINAL		
Lab sample id	N907145-08	Lab sample id	N907145-01	Client sample id	B0W0X9
Dept sample id	7166-008	Dept sample id	7166-001	Location/Matrix	105-DR SOLID
		Received	07/23/99	Collected	07/19/99 10:15
		% solids	100.0	Custody/SAF No	B99-076-01 B99-076

ANALYTE	DUPLICATE pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST	ORIGINAL pCi/g	2σ ERR (COUNT)	MDA pCi/g	QUALI-FIERS	RPD %	3σ PROT TOT LIMIT
Carbon 14	678	9.8	4.5	50		C	540	8.6	4.4		23	22

105-DR FSB-Concrete

QC-DUP#1 31579

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DUP
Version 3.06
Report date 10/07/99

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0475

N907145-01 B0W0X9

DATA SHEET

SDG	7166	Client/Case no	Hanford SDG-H0475
Contact	L.A. Johnson	Contract	TRB-SBB-207925
Lab sample id	N907145-01	Client sample id	B0W0X9
Dept sample id	7166-001	Location/Matrix	105-DR SOLID
Received	07/23/99	Collected	07/19/99 10:15
% solids	100.0	Custody/SAF No	B99-076-01 B99-076

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	6.23	0.17	0.087	400	J	H
Carbon 14	14762-75-5	540	8.6	4.4	50		C
Technetium 99	14133-76-7	1.37	0.51	0.88	15	J	TC
Uranium 233/234	U-233/234	3.10	0.33	0.080	1.0		U
Uranium 235	15117-96-1	0.321	0.091	0.048	1.0	J	U
Uranium 238	U-238	3.19	0.34	0.075	1.0		U
Plutonium 238	13981-16-3	5.77	0.50	0.031	1.0		PU
Plutonium 239/240	PU-239/240	358	24	0.050	1.0	B	PU
Nickel 63	13981-37-8	5360	54	5.3	30		NI_L
Americium 241	14596-10-2	54.7	11	0.34	1.0		AM
Total Strontium	SR-RAD	4500	9.0	0.27	1.0		SR
Potassium 40	13966-00-2	U		7.3		U	GAM
Barium 133	13981-41-4	U		2.6		UX	GAM
Cobalt 60	10198-40-0	323	2.5	1.1	0.050		GAM
Cesium 137	10045-97-3	5070	7.0	2.5	0.10		GAM
Europium 152	14683-23-9	806	6.4	7.1	0.10		GAM
Europium 154	15585-10-1	105	3.9	3.4	0.10		GAM
Europium 155	14391-16-3	4.38	2.9	4.0	0.10		GAM
Radium 226	13982-63-3	U		3.2	0.10	U	GAM
Radium 228	15262-20-1	U		7.2	0.20	U	GAM
Thorium 228	14274-82-9	U		2.8		U	GAM
Thorium 232	TH-232	U		7.2		U	GAM
Americium 241	14596-10-2	60.0	1.6	2.2			GAM
Uranium 238	U-238	U		250		U	GAM
Uranium 235	15117-96-1	U		5.8		U	GAM

105-DR FSB-Concrete

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	10/07/99

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0475

N907145-02 B0W0Y0

DATA SHEET

SDG	7166	Client/Case no	Hanford SDG-H0475
Contact	L.A. Johnson	Contract	TRB-SBB-207925
Lab sample id	N907145-02	Client sample id	B0W0Y0
Dept sample id	7166-002	Location/Matrix	105-DR SOLID
Received	07/23/99	Collected	07/19/99 10:45
% solids	100.0	Custody/SAF No	B99-076-01 B99-076

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	8.09	0.19	0.085	400	J	H
Carbon 14	14762-75-5	961	12	5.0	50		C
Technetium 99	14133-76-7	0.438	0.35	0.66	15	U	TC
Uranium 233/234	U-233/234	1.37	0.22	0.054	1.0		U
Uranium 235	15117-96-1	0.059	0.051	0.065	1.0	U	U
Uranium 238	U-238	1.21	0.20	0.054	1.0		U
Plutonium 238	13981-16-3	6.63	0.52	0.063	1.0		PU
Plutonium 239/240	PU-239/240	240	15	0.027	1.0	B	PU
Nickel 63	13981-37-8	11900	120	8.1	30		NI_L
Americium 241	14596-10-2	72.0	14	0.30	1.0		AM
Total Strontium	SR-RAD	1980	4.7	0.17	1.0	B	SR
Potassium 40	13966-00-2	U		11		U	GAM
Barium 133	13981-41-4	U		3.0		UX	GAM
Cobalt 60	10198-40-0	596	3.3	1.8	0.050		GAM
Cesium 137	10045-97-3	5140	7.0	2.6	0.10		GAM
Europium 152	14683-23-9	2810	10	9.7	0.10		GAM
Europium 154	15585-10-1	518	7.1	6.2	0.10		GAM
Europium 155	14391-16-3	21.5	4.3	6.3	0.10		GAM
Radium 226	13982-63-3	U		4.7	0.10	U	GAM
Radium 228	15262-20-1	U		9.9	0.20	U	GAM
Thorium 228	14274-82-9	U		3.3		U	GAM
Thorium 232	TH-232	U		9.9		U	GAM
Americium 241	14596-10-2	119	5.5	7.5			GAM
Uranium 238	U-238	U		340		U	GAM
Uranium 235	15117-96-1	U		7.0		U	GAM

105-DR FSB-Concrete

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	10/07/99

Data Package	IR	
H0472	Rad MS *	
H0475	Rad MS *	
H0473	Rad MS *	
H0538	Rad MS *	
	Rad - New Form 1s list liquid versus solid matrix	
H0542	Rad MS *	
H0544	Rad MS *	
	Metals - Case narrative states that only 1 sample was	
	analyzed (two were analyzed)	
H0551	Rad MS *	
H0514	CR VI - Method of analysis not identified	
H0506	Samples not listed in VSR	
	Rad MS *	
	Alcohols - Surrogate not run?	
H0534	Samples not listed in VSR	
	Was nickel, 3H and TC-99 analysis to be conducted	
	on samples BR0, BR1, BR2, BR4?	
	Rad MS *	
	PCBs - What do you want for CRDLs	
	alcohols - no surrogate?	
	MS/MSD for VOA	

L BR0, BR1, BR2 + BR4 - Case narrative ~~gives~~ states that the associated MS/MSD is the one for the other samples in the SDG - But they were not run together.

Bruce
Proceed with validation for all "Rad MS" issues identified above (*) and with missing alcohol surrogates (D) identified above

Robert Weiss
1-4-20

FAX

TECHLAW, INC.
451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 7 October 1999

Information Request

110475 - Rad

The new rad pages you sent me list the sample matrix as liquid versus solid everywhere else in the package.

BHI Sample Management
Phone: (509) 372-9346
FAX: (509) 372-9487

facsimile transmittal

To: Bruce Christian Fax: 375-5151

From: Rich Weiss Date: 10-20-99

Re: Count data Pages: 3

CC:

☐ Quick Turn / Priority Data ☐ Final Data Package

Bruce

Look this over for places in the procedure that I've missed and for areas that make validation either "blow up" or would apply more restrictive qualifiers than currently

Rich

Inconsistencies and inadequately defined criteria have been identified in "Data Validation Procedures for Radiochemical Analysis", WHC-SD-EN-SPP-001, Rev.1. The following identifies the affected sections, provides a consistent replacement, and clarifies interpretation for these issues.

Laboratory Blanks

Current Wording (by section):

4.3.1 - Prepared at the same time and analyzed with the samples using the same procedure.

5.3.1 - Prepared at the same time and analyzed with the samples using the same procedure.

6.3.1 - Prepared at the same time and analyzed with the samples using the same procedure, aliquot size, and counting time.

5.3.1 – Analyzed using a similar aliquot size, counted in the same geometry and count time as the samples.

7.3.1 - Prepared at the same time and analyzed with the samples using the same procedure.

8.3.1 – Laboratory blanks have been prepared, distilled and analyzed using the same procedure and aliquot size as the samples.

9.3.1 - Prepared at the same time and analyzed in the same batch, using the same procedure, as the associated samples.

Laboratory Control or Blank Spike Samples

Current Wording (by section):

4.4.1 - Prepared at the same time and analyzed in the same batch, using the same procedure, as the associated samples.

5.4.1 - Prepared at the same time and analyzed in the same batch, using the same procedure, as the associated samples.

6.4.1 - Prepared at the same time and analyzed in the same batch, using the same procedure, as the associated samples.

7.4.1 – LCS of BSS was analyzed in the same geometry, count duration, and aliquot size as the samples.

8.4.1 - Prepared at the same time and analyzed in the same batch, using the same procedure, as the associated samples.

9.4.1 - Prepared at the same time and analyzed in the same batch, using the same procedure, as the associated samples.

Matrix Spike Samples

Current Wording (by section):

Section 4 - no matrix spike requirements

5.4.3 - Prepared at the same time and analyzed in the same batch, using the same procedure, as the associated samples.

6.4.3 - Prepared at the same time and analyzed in the same batch, using the same procedure, as the associated samples.

Section 7 – no matrix spike requirements.

8.4.3 - Prepared at the same time and analyzed in the same batch, using the same procedure, as the associated samples.

Section 9 – no matrix spike requirements.

Laboratory Duplicates

Current Wording (by section):

4.5.1 – The duplicate analysis was prepared and analyzed in the same batch, using the same procedure as the associated samples.

5.5.1 – The duplicate analysis was prepared and analyzed in the same batch, using the same procedure as the associated samples.

6.5.1 – The duplicate analysis was prepared and analyzed in the same batch, using the same procedure as the associated samples.

7.5.1 – The duplicate analysis was prepared and analyzed at the same time, using the same geometry, aliquot size and count duration as the samples.

8.5.1 – Prepared and analyzed using the same aliquot size as the samples.

9.5.1 – The duplicate analysis was prepared and analyzed in the same batch, using the same procedure as the associated samples.

Replacement Wording (all sections above):

Preparation performed as part of an analytical batch, at the same time, using the same procedures and aliquot sizes as the associated samples. All components of the analytical batch (QC and sample) counted using the same or comparable geometry and count duration within a two week time period.

Laboratory failure to meet the criteria (in any section) – qualify all associated sample results as estimated (J for detects, UJ for non-detects).

TRANSMISSION RESULT REPORT (OCT 20 '99 11:32AM)

BHI S&D MANAGEMENT 509 372 9487

(AUTO)

THE FOLLOWING FILE(S) ERASED

FILE	FILE TYPE	OPTION	TEL NO.	PAGE	RESULT
057	MEMORY TX		3755151	03/03	OK

ERRORS

1) HANG UP OR LINE FAIL 2) BUSY 3) NO ANSWER 4) NO FACSIMILE CONNECTION

BHI Sample Management
Phone: (509) 372-9346
FAX: (509) 372-9487

facsimile transmittal

To: Bruce Christian Fax: 375-5151

From: Rich Weiss Date: 10-20-99

Re: Count after Pages: 3

CC:

☐ Quick Turn / Priority Data ☐ Final Data Package

Bruce

Look this over for places in the

HO475

BHI Sample Management
Phone: (509) 372-9346
FAX: (509) 372-9487

facsimile transmittal

To: Bruce Christian Fax: 375-5151

From: Rich Weiss Date: 10-21-99

Re: ~~PCB~~ PCB surrogates Pages: 3

CC:

☐ Quick Turn / Priority Data ☐ Final Data Package

Bruce

The last sheet is an email from the labs with surrogate info from the two 'diluted out' samples for SDG HO475. I've asked for replacement pages and similar dats for HO483. IF I haven't talked to you when you get this, give me a call (372-7552)

Rich

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 20 October 1999

110475 - PCB analysis

Due to surrogates being diluted out, the following samples have been rejected.

All except arochlor-1254	UR	B0W0Y2, B0W0Y3	Surrogate diluted out

110483 - PCB analysis

Due to surrogates being diluted out, the following samples have been rejected.

All except Aroclor-1254	UR	B0W3Y6	Surrogate diluted out

Weiss, Richard L

From: Johnson, Orlette [johnsono@recralab.com]
Sent: Thursday, October 21, 1999 8:18 AM
To: Rich Weiss
Subject: H0475

Surrogate recoveries are calculated as follows:

B0WY2 = TCMX 30%; DCB 10%
B0WY3 = TCMX 30%; DCB 11%

Do we need to reissue this report?

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 20 October 1999

I10475 - PCB analysis

Due to surrogates being diluted out, the following samples have been rejected.

All except arochlor-1254	UR	B0W0Y2, B0W0Y3	Surrogate diluted out

I10483 - PCB analysis

Due to surrogates being diluted out, the following samples have been rejected.

All except Aroclor-1254	UR	B0W3Y6	Surrogate diluted out

FAX

TECHLAW, INC.
451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 7 October 1999

Information Request

110475 - Rad

There is no indication of a matrix spike for 3H, C-14

Lab is reanalyzing H^3 & C-14.
Will provide replacement results

RLW 10/11/99

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 7 October 1999

Information Request

W02840 - inorganics

The sample sumary for W02840 states that sample B0W100 is an equipment blank for sample B0W107 - however, the sample summary for W02834 states that sample B0W107 is the equipment blank. Which one is it.

See revised Summaries

-KLM 10-7-99

FAX

TECHLAW, INC.
451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 7 October 1999

Information Request

110475 - Rad

The sample summary states that sample B0W0Y0 is an equipment blank. Can you double check because it doesn't look like one.

See revised summaries

RLW 10-7-99

SAMPLE SUMMARY

Project ID:	*105-DR FSB - Concrete*	**Sampling Team:**	*ERC Field Sampling*
Task ID:	*3*	**Sampling Mgr/Coordinator:**	*St. John*
Opperable Unit:	*100-DR*	**Samplers:**	*FAHLBERG, RT*
SAF Number:	*B99-076*	**Field Logbook ID:**	*EL 1281*
		Sampling Media:	*Other Solid*

Sample Number	SDG Number	Location	Analyte Code	Laboratory	Date Collected	Date Shipped	Comments
B0W0X9	H0475	105-DR	2,3,4,5,7,8,9,10,11, 12,13,14	TMA/RECRA	7/19/99 10:15 AM	7/22/99 1:36 PM	Location B/Samples NOT received at RECRA due to bottle mix-up - chemical analyses canceled.
B0W0Y0	H0475	105-DR	2,3,4,5,7,8,9,10,11, 12,13,14	TMA/RECRA	7/19/99 10:45 AM	7/22/99 1:36 PM	Location D/Samples NOT received at RECRA due to bottle mix-up - chemical analyses canceled.
B0W0Y1	H0475	105-DR	2,3,4,5,7,8,9,10,11, 12,13,14	TMA/RECRA	7/20/99 8:55 AM	7/22/99 1:30 PM	Location A/Samples NOT received at TMA due to bottle mix-up - radiochemistry analyses canceled.
B0W0Y2	H0475	105-DR	2,3,4,5,7,8,9,10,11, 12,13,14	TMA/RECRA	7/20/99 9:05 AM	7/22/99 1:30 PM	Location C-1/Samples NOT received at TMA due to bottle mix-up - radiochemistry analyses canceled.
B0W0Y3	H0475	105-DR	2,3,4,5,7,8,9,10,11, 12,13,14	TMA/RECRA	7/20/99 9:20 AM	7/22/99 1:30 PM	Location C-1/Samples NOT received at TMA due to bottle mix-up - radiochemistry analyses canceled.
B0W0Y4	RCF99076	105DR	15	Radiological Counting Facility	7/19/99 10:15 AM	7/20/99 7:25 AM	Location B Rad. Screen for {B0W0X9}
B0W0Y5	RCF99076	105DR	15	Radiological Counting Facility	7/19/99 10:45 AM	7/20/99 7:25 AM	Location D Rad. Screen for {B0W0Y0}
B0W0Y6	RCF99076	105DR	15	Radiological Counting Facility	7/20/99 8:55 AM	7/20/99 1:50 PM	Location A Rad. Screen for {B0W0Y1}
B0W0Y7	RCF99076		15	Radiological Counting Facility	7/20/99 9:05 AM	7/20/99 1:50 PM	Location C-1 Rad. Screen for {B0W0Y2}
B0W0Y8	RCF99076	105DR	15	Radiological Counting Facility	7/20/99 9:20 AM	7/20/99 1:50 PM	Location C-1 Rad. Screen for {B0W0Y3}
B0W0Y9	W02840	105DR	1	Quanterra Incorporated	7/19/99 10:15 AM	7/19/99 4:30 PM	Location B

SAMPLE SUMMARY

Project ID:	*105-DR FSB - Concrete*	**Sampling Team:**	*ERC Field Sampling*
Task ID:	*3*	**Sampling Mgr/Coordinator:**	*St. John*
Opperable Unit:	*100-DR*	**Samplers:**	*FAHLBERG, RT*
SAF Number:	*B99-076*	**Field Logbook ID:**	*EL 1281*
		Sampling Media:	*Other Solid*

Sample Number	SDG Number	Location	Analyte Code	Laboratory	Date Collected	Date Shipped	Comments
B0W100	W02840	105DR	1	Quanterra Incorporated	7/19/99 10:45 AM	7/19/99 4:30 PM	Location D
B0W101	W02841	105DR	1	Quanterra Incorporated	7/20/99 8:55 AM	7/20/99 2:45 PM	Location A
B0W102	W02841	105DR	1	Quanterra Incorporated	7/20/99 9:05 AM	7/20/99 2:45 PM	Location C-1
B0W103	W02841	105DR	1	Quanterra Incorporated	7/20/99 9:20 AM	7/20/99 2:45 PM	Location C-1
B0W3Y6	H0483	105 DR	2,3,4	TMA/RECRA	8/4/99 9:45 AM	8/5/99 2:00 PM	Location B - original location extended +/- 4 inches south
B0W3Y7	H0483	105 DR	2,3,4	TMA/RECRA	8/4/99 9:55 AM	8/5/99 2:00 PM	Location D
B0W3Y9	H0483	105 DR	5,7,8,9,10,11,12,13,14	TMA/RECRA	8/4/99 9:35 AM	8/5/99 2:00 PM	Location A - original location extended +/- 4 inches east
B0W400	H0483	105 DR	5,7,8,9,10,11,12,13,14	TMA/RECRA	8/4/99 9:25 AM	8/5/99 2:00 PM	Location C-1 - original location extended +/- 4 inches west
B0W401	H0483	105 DR	5,7,8,9,10,11,12,13,14	TMA/RECRA	8/4/99 9:09 AM	8/5/99 2:00 PM	Location C-2 - original location extended +/- 4 inches east

Analyte Codes:

1) Chromium Hex - 7196
2) PCBs - 8080
3) ICP Metals - 6010A (Add-on) {Lead}

SAMPLE SUMMARY

Project ID:	*105-DR FSB - Concrete*	**Sampling Team:**	*ERC Field Sampling*
Task ID:	*3*	**Sampling Mgr/Coordinator:**	*St. John*
Opperable Unit:	*100-DR*	**Samplers:**	*FAHLBERG, RT*
SAF Number:	*B99-076*	**Field Logbook ID:**	*EL 1281*
		Sampling Media:	*Other Solid*

Sample Number	SDG Number	Location	Analyte Code	Laboratory	Date Collected	Date Shipped	Comments

4) Mercury - 7471 - (CV)
5) Gamma Spectroscopy {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}
6) Gamma Spec - Add-on {Barium-133}
7) Isotopic Plutonium
8) Isotopic Uranium
9) Americium-241
10) Strontium-89,90 -- Total Sr
11) Technetium-99
12) Nickel-63
13) Carbon-14
14) Tritium - H3
15) Rad Screen

TRANSMISSION RESULT REPORT (OCT 07 '99 11:55AM)

BHI S&D MANAGEMENT 509 372 9487

(AUTO)

THE FOLLOWING FILE(S) ERASED

FILE	FILE TYPE	OPTION	TEL NO.	PAGE	RESULT
071	MEMORY TX		3755151	05/05	OK

ERRORS

1) HANG UP OR LINE FAIL 2) BUSY 3) NO ANSWER 4) NO FACSIMILE CONNECTION

Oct-07-99 08:28A

OCT 07 '99 08:43AM P.01

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 7 October 1999

Information Request

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 7 October 1999

Information Request

110475 - Rad

The sample summary states that sample B0W0Y0 is an equipment blank. Can you double check because it doesn't look like one.

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 7 October 1999

Information Request

110475 - Rad

The new rad pages you sent me list the sample matrix as liquid versus solid everywhere else in the package.

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 7 October 1999

Information Request

110475 - Rad

There is no indication of a matrix spike for 3H, C-14